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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Kenji MASAKI

Application No.: 09/287,530 Art Unit: 2625

Filed: April 7, 1999 Examiner: B. Choobin

For: DIGITAL IMAGE PROCESSING APPARATUS

SUBMISSION OF VERIFIED TRANSLATION OF FOREIGN PRIORITY DOCUMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This application claims priority under 35 USC 119 to Japanese patent application no. 115868/1998, filed April 13, 1998. Pursuant to 35 USC 119, a certified copy of said patent application was submitted on April 7, 1999, thereby perfecting the priority claim.

In support of the Applicant's claim for priority, filed herewith is a verified translation of the above-identified priority document.

It is respectfully requested that the receipt of the document attached hereto be acknowledged in this application.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection

with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 325772009100.

Dated: November 21, 2003

Respectfully submitted,

By Deborah S. Gladstein

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APPARATUS

VERIFIED TRANSLATION OF PRIORITY DOCUMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I declare that I can read and speak both the English and Japanese languages, and that I have translated, fully and accurately, the following Japanese application for which priority is claimed:

115868/1998, filed April 13, 1998

A copy of my English translation of the above priority application is attached hereto.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any registration resulting therefrom.

Dated: November 18, 2003

By: Kazuhito Kodama
Kazuhito KODAMA

PATENT OFFICE

JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of the following application as filed with this Office

Date of Application: April 13, 1998

Application Number: Patent Application No. 115868/1998

Applicant(s): Minolta Co., Ltd.

January 8, 1999

Commissioner,

Patent Office

Takeshi Isayama

Certificate No. 10-3105299

[Name of Document] Application for Patent

[Reference No.] A98-0001

[Date of Application] April 13, 1998

[Destination] Commissioner, Patent Office

[International Patent Classification] G06T 3/00

[Title of the Invention] DIGITAL IMAGE PROCESSING APPARATUS

[Number of Claims] 12

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[Telephone No.] 03-3585-2364

[List of Document Submitted]

[Object Name] Specification 1

[Object Name] Drawings 1

[Object Name] Abstract 1

[Number of Comprehensive Power of Attorney] 9716023

[Document's Name] SPECIFICATION

[Title of the Invention] DIGITAL IMAGE PROCESSING APPARATUS

[Scope of Claims]

[Claim 1] An image processing apparatus characterized by including:

a function to place bits for describing information different from information of image data obtained by image processing on original image data, respectively in specific bit positions of pixel data at a plurality of predetermined positions of said processed image, said pixels being dispersed on the image surface of the processed image data.

[Claim 2] An image processing apparatus according to claim 1, characterized in that said information different from information of said processed image data is information describing the contents of image processing performed on said original image data to obtain said processed image data.

[Claim 3] An image processing apparatus according to claim 1, characterized in that said information different from information of said processed image data is information describing time when said image processing is performed on original image data to

obtain said processed image data, or that said information different from information for describing said processed image data is information describing time when said bits are placed.

[Claim 4] An image processing method characterized by comprising:

a first step to obtain first processed image data by performing image processing on original image data; and

a second step to place bits for describing information different from information of said first processed image data respectively in specific bit positions of pixel data at a plurality of predetermined positions of said first processed image, said pixels being dispersed on the image surface of the processed image data.

[Claim 5] An image processing method according to claim 4, characterized in that said information different from information of said first processed image data is information describing the contents of image processing performed on said original image data to obtain said first processed image data.

[Claim 6] An image processing method according to claim 4, characterized in that said information

different from information of said first processed image data is information describing time when said first step is performed, or time when said second step is performed.

[Claim 7] A recording medium in which a program for a computer is stored, characterized in that said program is one that enables the computer to perform the following processing:

placing bits for describing information different from information of image data, said processed image data being obtained by image processing on original image data, respectively in specific bit positions of pixel data at predetermined positions of said processed image, said pixels being dispersed at a plurality of predetermined positions on said image.

[Claim 8] A recording medium according to claim 7, characterized in that said information different from information of said processed image data is information describing the contents of image processing performed on said original image data to obtain said processed image data.

[Claim 9] A recording medium according to claim 7, characterized in that said information different from information of said processed image data is information

describing time when said image processing is performed on original image data to obtain said processed image data, or time when said bits are placed.

[Claim 10] Image data characterized by bits for describing information different from information of processed image data obtained by image processing on original image data, which are placed respectively in specific bit positions of pixel data at predetermined positions of said processed image, said pixels being dispersed at a plurality of predetermined positions on said image.

[Claim 11] Image data according to claim 10, characterized in that said information different from information of said processed image data is information describing the contents of image processing performed on said original image data to obtain said processed image data.

[Claim 12] Image data according to claim 10, wherein said information different from information of said processed image data is information describing time when said image processing is performed on said original image data to obtain said processed image data, or time when said bits are placed.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Pertains]

This invention relates to the field of digital image processing.

[0002]

[Prior Art]

Digital image processing techniques have major features of easy image editing and modifications.

[0003]

Fig. 14 is a conceptual diagram showing the configuration of such image automatic correction software.

[0004]

Usually an editor (operator) performs various operations on an original image with the aid of such software, thereby obtaining a desired image in a trial and error fashion.

[0005]

In such a process, an image at each step in which an original image is subjected to different processing as shown in Fig. 15 is saved, and if a desired image is not obtained by processing in one way, processing is often performed again from the beginning

or performed on an intermediate image in a different way.

[0006]

In the process of the operations, carefully making records of an original image pertaining to image data created at each step, information about processing on the images, and other information may avoid confusion, but an editor often concentrates attention to processing itself and neglects such recording, so that data at intermediate steps is disorderly accumulated, with the result that the intermediate data cannot be reused. For this reason, operations that have been heretofore performed often become meaningless.

[0007]

In the case where a plurality of images are processed at a time as in automatic image correction software as shown in Fig. 16, the same problem as described above occurs since it cannot be determined what processing the program performed on each image.

[0008]

Furthermore, also when image data is passed to different editors, the editors will perform similar operations because the history of the image data is not always clear.

[0009]

Although an image produced as a result of image processing may be intuitively different from an original image thereof, it cannot be practically determined visually what processing has been performed to produce the image, what the original image was like, which of two pieces of data, if any, is the original image, and the like.

[0010]

Presently, numerous file formats of images are proposed and some of them permit predetermined information to be written in advance in a predetermined area (tag) of a file. However, some file formats do not have such an area or have no area corresponding to information to be written; these formats are inconvenient to use because desired information cannot be recorded.

[0011]

The Japanese Unexamined Patent Publication No. 241403/1996 discloses a system for placing a visible "watermark" on a digital image, wherein an image of the watermark is combined with the digital image.

[0012]

The publication describes the method as follows.

[0013]

The pixels of the watermark image are examined, and for each pixel whose value is not a specified "transparent" value, the corresponding pixel of the original image is modified by changing its brightness but its chromaticities. This results in a visible mark which allows the contents of image to be viewed clearly, but which discourages unauthorized use of the image.

[0014]

The important matter of this patent is that the contents of image are visible and thereby the unauthorized use of the image is prevented.

[0015]

[Problem to be Solved by the Invention]

An object of this invention, which is different from that of the Japanese patent, is to solve the problem described above by arresting the recognition of written information by users, that is, reducing to a minimum a visible influence on images, and nevertheless by making it possible to determine what processing was performed on image data or when the processing was performed, from information of the image data itself.

[0016]

[Means for Solving the Problem]

The above problem is solved by the following means:

[0017]

Solving means of the invention according to claim 1

An image processing apparatus characterized by including:

a function to place bits for describing information different from information of image data obtained by image processing on original image data, respectively in specific bit positions of pixel data at a plurality of predetermined positions of the processed image, the pixels being dispersed on the image surface of the processed image data.

[0018]

Solving means of the invention according to claim 2

An image processing apparatus according to claim 1, characterized in that the information different from information of the processed image data is information describing the contents of image processing performed on the original image data to obtain the processed image data.

[0019]

Solving means of the invention according to claim 3

An image processing apparatus according to claim

1, characterized in that the information different from information of the processed image data is information describing time when the image processing is performed on original image data to obtain the processed image data, or that the information different from information for describing the processed image data is information describing time when the bits are placed.

[0020]

Solving means of the invention according to claim 4

An image processing method characterized by comprising:

a first step to obtain first processed image data by performing image processing on original image data; and

a second step to place bits for describing information different from information of the first processed image data respectively in specific bit positions of pixel data at a plurality of predetermined positions of the first processed image, the pixels being dispersed on the image surface of the processed image data.

[0021]

Solving means of the invention according to claim 5

An image processing method according to claim 4,

characterized in that the information different from information of the first processed image data is information describing the contents of image processing performed on the original image data to obtain the first processed image data.

[0022]

Solving means of the invention according to claim 6

An image processing method according to claim 4, characterized in that the information different from information of the first processed image data is information describing time when the first step is performed, or time when the second step is performed.

[0023]

Solving means of the invention according to claim 7

A recording medium in which a program for a computer is stored, characterized in that the program is one that enables the computer to perform the following processing:

[0024]

Placing bits for describing information different from information of image data, the processed image data being obtained by image processing on original image data, respectively in specific bit positions of pixel data at predetermined positions of

the processed image, the pixels being dispersed at a plurality of predetermined positions on the image.

[0025]

Solving means of the invention according to claim 8

A recording medium according to claim 7, characterized in that the information different from information of the processed image data is information describing the contents of image processing performed on the original image data to obtain the processed image data.

[0026]

Solving means of the invention according to claim 9

A recording medium according to claim 7, characterized in that the information different from information of the processed image data is information describing time when the image processing is performed on original image data to obtain the processed image data, or time when the bits are placed.

[0027]

Solving means of the invention according to claim 10

Image data characterized by bits for describing information different from information of processed image data obtained by image processing on original image data, which are placed respectively in specific

bit positions of pixel data at predetermined positions of the processed image, the pixels being dispersed at a plurality of predetermined positions on the image.

[0028]

Solving means of the invention according to claim 11

Image data according to claim 10, characterized in that the information different from information of the processed image data is information describing the contents of image processing performed on the original image data to obtain the processed image data.

[0029]

Solving means of the invention according to claim 12

Image data according to claim 10, wherein the information different from information of the processed image data is information describing time when the image processing is performed on the original image data to obtain the processed image data, or time when the bits are placed.

[0030]

[Preferred Embodiments]

The present invention is based on the following embodiments:

[0031]

Embodiment of the invention according to claim 1

An image processing apparatus of the present invention places bits for describing information different from information of image data obtained by image processing on original image data, respectively in specific bit positions of pixel data at a plurality of predetermined positions of the processed image, the pixels being dispersed on the image surface of the processed image data.

[0032]

Embodiment of the invention according to claim 2

An image processing apparatus according to claim 1 is characterized in that the information different from information of the processed image data is information describing the contents of image processing performed on the original image data to obtain the processed image data.

[0033]

Embodiment of the invention according to claim 3

An image processing apparatus according to claim 1 is characterized in that the information different from information of the processed image data is information describing time when the image processing is performed on original image data to obtain the processed image data, or that the information different

from information for describing the processed image data is information describing time when the bits are placed.

[0034]

Embodiment of the invention according to claim 4

An image processing method comprises a first step to obtain first processed image data by performing image processing on original image data; and a second step to place bits for describing information different from information of the first processed image data respectively in specific bit positions of pixel data at a plurality of predetermined positions of the first processed image, the pixels being dispersed on the image surface of the processed image data.

[0035]

Embodiment of the invention according to claim 5

An image processing method according to claim 4 is characterized in that the information different from information of the first processed image data is information describing the contents of image processing performed on the original image data to obtain the first processed image data.

[0036]

Embodiment of the invention according to claim 6

An image processing method according to claim 4 is characterized in that the information different from information of the first processed image data is information describing time when the first step is performed, or time when the second step is performed.

[0037]

Embodiment of the invention according to claim 7

A recording medium in which a program for a computer is stored is characterized in that the program is one that enables the computer to perform the following processing: placing bits for describing information different from information of image data, the processed image data being obtained by image processing on original image data, respectively in specific bit positions of pixel data at predetermined positions of the processed image, the pixels being dispersed at a plurality of predetermined positions on the image.

[0038]

Embodiment of the invention according to claim 8

A recording medium according to claim 7 is characterized in that the information different from information of the processed image data is information describing the contents of image processing performed

on the original image data to obtain the processed image data.

[0039]

Embodiment of the invention according to claim 9

A recording medium according to claim 7, is characterized in that the information different from information of the processed image data is information describing time when the image processing is performed on original image data to obtain the processed image data, or time when the bits are placed.

[0040]

Embodiment of the invention according to claim 10

Image data characterized by bits for describing information different from information of processed image data obtained by image processing on original image data, which are placed respectively in specific bit positions of pixel data at predetermined positions of the processed image, the pixels being dispersed at a plurality of predetermined positions on the image.

[0041]

Embodiment of the invention according to claim 11

Image data according to claim 10 is characterized in that the information different from information of the processed image data is information

describing the contents of image processing performed on the original image data to obtain the processed image data.

[0042]

Embodiment of the invention according to claim 12

Image data according to claim 10, wherein the information different from information of the processed image data is information describing time when the image processing is performed on the original image data to obtain the processed image data, or time when the bits are placed.

[0043]

[Embodiments]

First embodiment

Software that edits and processes a full color image on a personal computer has a flow of operations shown in Fig. 15.

[0044]

Fig. 1 is a flowchart for explaining the outline of this invention. This invention is provided with a subroutine "Writing processing records" as shown in the figure.

[0045]

In this subroutine, necessary data is embedded

in image data without substantially influencing the image. This method will be described later. The flowchart of Fig. 1 will be described.

[0046]

This program, when started (step S1), in step S2, selects an image to be subjected to image processing. In step S3, the program edits and processes the selected image. The contents of the image processing vary depending on purposes. The program displays the processed image on a display unit (step S4), checks to see if it is as intended, proceeds to the subroutine "Writing processing records" (step S5), and writes a record of the contents of the performed image processing to image data. The program saves the image data to which processing contents are written (step S6), and terminates in step S7.

[0047]

Fig. 2 is a subroutine flowchart showing the contents of the subroutine "Writing processing records" (step S5).

[0048]

The subroutine "Writing processing records", when started (step S11), transfers the contents of image memory to a work memory. The subroutine performs

bit packing on write data in step S13. The bit packing is performed as described below.

[0049]

The contents of image processing are assigned code numbers that can be represented in one byte, as shown in the table of Fig. 3. For example, if the contents of image processing are contrast correction by method 2, a code of 22 in hexadecimal notation is assigned.

[0050]

Date is represented by elapsed time, in minutes, from 0:0 a.m., January 1, 1998. For this reason, 32 bits are used. Four-bit data is provided to check the version of processing history.

[0051]

These information items are as shown in Fig. 4 when sequentially arranged. A is a portion indicating the contents of image processing, B is a portion indicating date, C is a portion indicating version check information, and b is a bit making up these items.

[0052]

These bits are placed dispersively over the surface of an image subjected to image processing. The positions in which they are placed are calculated in

step S14.

[0053]

An image used in this example is a full-color natural image the size of which is 1280 by 1024 pixels. The positions of the 44 bits in the image are decided. The bits are embedded as described below with respect to each of the R, G, and B planes of the image.

[0054]

The image is divided by 8 both in the horizontal and vertical directions into 64 (8 × 8) units, values with a fractional portion truncated. The central pixel both in the horizontal and vertical directions of each unit is used to embed information, and bit positions are decided as shown in the table of Fig. 5.

[0055]

In each position, the 44-bit information is embedded in the least significant bit (LSB) positions of intensity data of each pixel.

[0056]

Since a pixel position in which each of the 44 bits is placed is decide in this way, the subroutine proceeds to step S15.

[0057]

In this step, the pixel data at the each

position of the image is modified as follows.

[0058]

Data of each pixel, which is one byte, assumes any hexadecimal value from 00 to FF. As a result of the logical AND operation of the data with the hexadecimal value FE, pixel data with only the least significant bit set to 0 is obtained (Fig. 6).

[0059]

As a result of the logical OR operation of bits of the above packed data and pixel data with the least significant bit set to 0, pixel data with necessary data embedded will be obtained (Fig. 7).

[0060]

The subroutine transfers the obtained data to the image memory (step S16) and exits in step S17.

[0061]

Since processing information is written dispersively in this way and only the least significant bit of image data changes, there is no substantial reduction in image quality.

[0062]

Second embodiment

In the above-mentioned embodiment (first embodiment), an image is manipulated in the same way

for each plane of R, G, and B colors. Consequently, the processing information may be visible on faint images. In a second embodiment, this drawback is eliminated by making the processing information more inconspicuous.

[0063]

Figs. 8, 9, and 10 are tables showing the positions of pixels to which processing information is written, with respect to R, G, and B planes.

[0064]

As shown in the tables, the positions of pixels in which processing information is embedded are reversely shifted five pixels relative to the R plane, in the case of the G and B planes.

[0065]

By this arrangement, processing information is embedded more dispersively, making the existence of the processing information more inconspicuous.

[0066]

Even in an image to which no processing information is written, pixel data at the above-mentioned positions may happen to be arranged meaningfully. At this time, the pixel data may be read mistakenly as information. In this embodiment, identical information is written to each of the R, G,

and B planes. During reading of the information, by checking whether these information pieces match, such an accident can be eliminated.

[0067]

Third embodiment

The second embodiment provides for the case where given information is visible as noise. However, since the 44 bits may accidentally form a meaningful data array, in the third embodiment, as shown in Figs. 11, 12, and 13, five bits are added as parity data to make 49-bit configuration.

[0068]

Fourth embodiment

In the embodiments that have been heretofore described, the positions of pixels to embed processing information in are fixed. In this embodiment, several patterns of these positions are provided, and a pattern can be selected from these patterns so that influence on the image is minimized.

[0069]

Although the least significant bit of image data is modified in the above-mentioned first to fourth embodiments, other than the least significant bit may be modified if the modification is inconspicuous. For

example, if the range of intensity of image is wide (e.g., 16 bits), the second or third bit position from the least significant bit position may be modified. Also, if resolution is high, a higher bit position may be modified because modification of a single pixel is inconspicuous.

[0070]

As seen in these embodiments, since information is embedded in image data itself, various information can be recorded regardless of the formats of image files.

[0071]

[Effect of the Invention]

The above mentioned constitution of the present invention produces the following good results:

[0072]

1. The history of image processing on digital images can be saved in image data itself.

[0073]

2. In the case where a plurality of images are processed at a time as in automatic image correction software, it cannot be determined with the prior art what processing the program performed on each piece of image data. However, information about the processing

can be saved as a record.

[0074]

3. Since the history of processing is recorded in image data itself according to this invention, an original image can be restored by reversing the processing.

[0075]

4. Even if there are a number of similar images, according to this invention, the oldest image or an original image can be easily recognized from the history of processing.

[0076]

5. Since any information can be recorded, a picture date and names can be recorded and saved so that they are hidden from view.

[0077]

6. Since information can also be cryptographically recorded, although processing is heavily loaded, secret information can be thereby recorded.

[0078]

7. Since information is embedded in image data itself, different types of information can be recorded regardless of the formats of image files.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 is a flowchart for explaining the outline of this invention.

[Fig. 2]

Fig. 2 is a subroutine flowchart showing the contents of a subroutine "Writing processing records" in Fig. 1.

[Fig. 3]

Fig. 3 is a table showing the correspondences between image processing contents and code numbers representing them.

[Fig. 4]

Fig. 4 is a diagram showing information embedded in image data - in this example, processing information, date information, and version information.

[Fig. 5]

Fig. 5 is a table representing the image positions of pixels in which processing information is embedded.

[Fig. 6]

Fig. 6 is a diagram for explaining an operation to set the least significant bit of pixel data to 0.

[Fig. 7]

Fig. 7 is a diagram for explaining the principle

to embed processing information in the least significant bit of pixel data, which was set to 0 in Fig. 6.

[Fig. 8]

Fig. 8 is a table showing, with respect to an R plane, the positions of pixels to which processing information is written in a second embodiment.

[Fig. 9]

Fig. 9 is a table showing, with respect to a G plane, the positions of pixels to which processing information is written in a second embodiment.

[Fig. 10]

Fig. 10 is a table showing, with respect to a B plane, the positions of pixels to which processing information is written in a second embodiment.

[Fig. 11]

Fig. 11 is a table showing, with respect to an R plane, the positions of pixels to which processing information is written in a third embodiment.

[Fig. 12]

Fig. 12 is a table showing, with respect to a G plane, the positions of pixels to which processing information is written in a third embodiment.

[Fig. 13]

Fig. 13 is a table showing, with respect to a B plane, the positions of pixels to which processing information is written in a third embodiment.

[Fig. 14]

Fig. 14 is a conceptual diagram showing the configuration of image automatic correction software.

[Fig. 15]

Fig. 15 is a diagram for explaining the flow of operations of software that edits and processes a full color image on a personal computer.

[Fig. 16]

Fig. 16 is a diagram for explaining the flow of software that processes a plurality of images at a time.

[Document's Name] DRAWINGS

FIG. 1

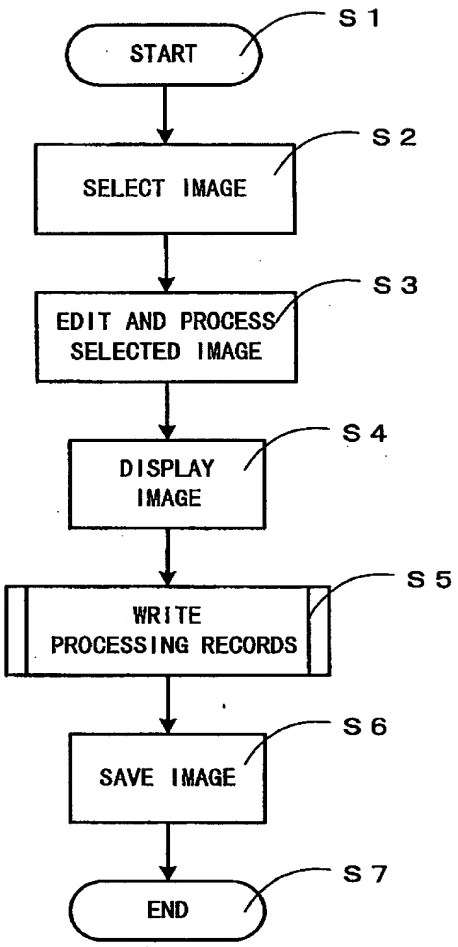


FIG. 2

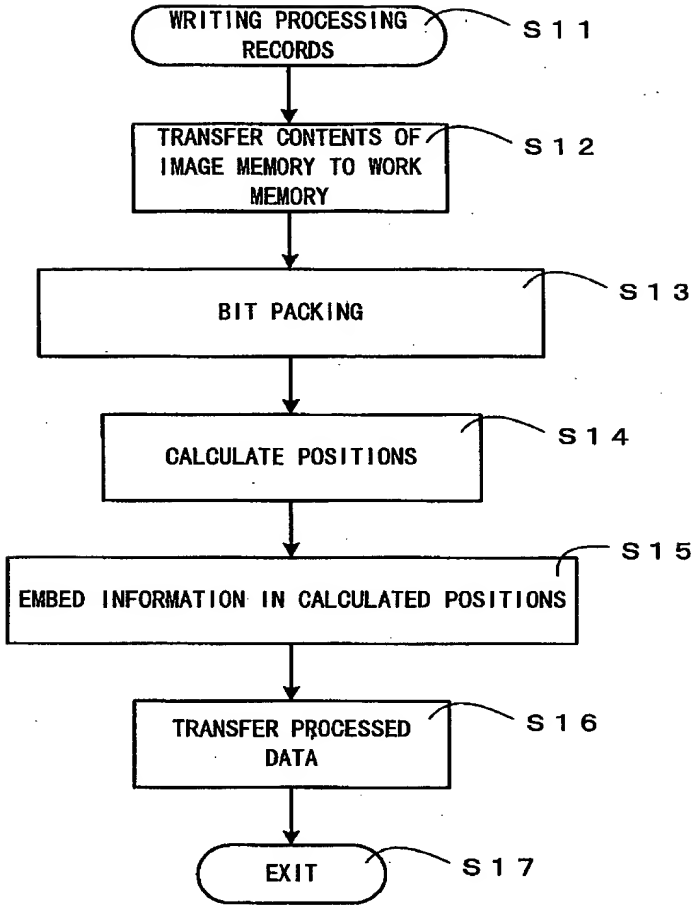

WRITING PROCESSING RECORDS
S11
TRANSFER CONTENTS OF IMAGE MEMORY TO WORK MEMORY
S12
BIT PACKING
S13
CALCULATE POSITIONS
S14
EMBED INFORMATION IN CALCULATED POSITIONS
S15
TRANSFER PROCESSED DATA
S16
EXIT
S17

FIG. 3

IMAGE PROCESSING	CODE
COLOR CORRECTION - METHOD 1	1 1
COLOR CORRECTION - METHOD 2	1 2
COLOR CORRECTION - METHOD 3	1 3
COLOR CORRECTION - METHOD 4	1 4
CONTRAST CORRECTION - METHOD 1	2 1
CONTRAST CORRECTION - METHOD 2	2 2
CONTRAST CORRECTION - METHOD 3	2 3
CONTRAST CORRECTION - METHOD 4	2 4
SHARPNESS CORRECTION METHOD - 1	3 1
SHARPNESS CORRECTION METHOD - 2	3 2
SHARPNESS CORRECTION METHOD - 3	3 3
SHARPNESS CORRECTION METHOD - 4	3 4

FIG. 4

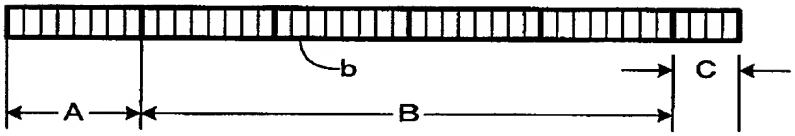


FIG. 5

BIT	UNIT (H , V)
1ST BIT	1ST , 1ST
2ND BIT	2ND , 1ST
⋮	⋮
44THD BIT	2ND , 7TH

FIG. 6

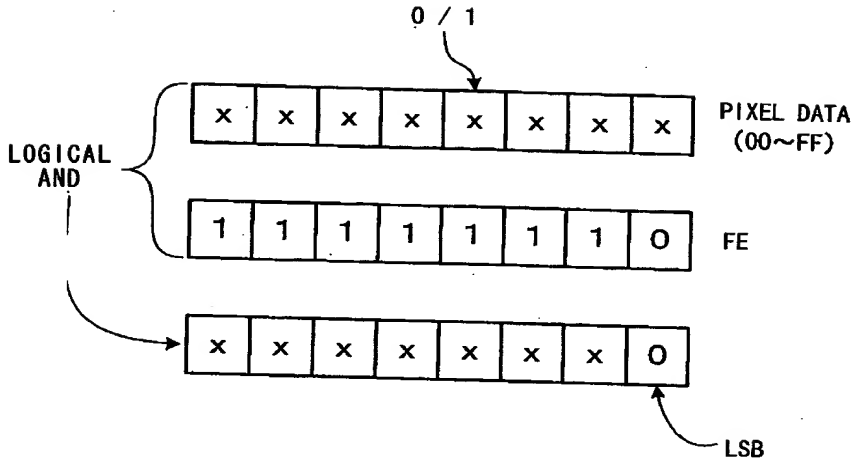

0 / 1
LOGICAL AND
x x x x x x x x
PIXEL DATA (00~FF)
1 1 1 1 1 1 1 0
FE
x x x x x x x 0
LSB

FIG. 7

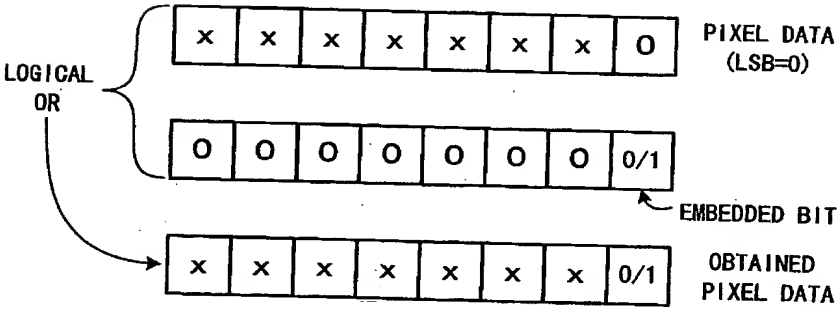

LOGICAL OR
x x x x x x x 0
PIXEL DATA (LSB=0)
0 0 0 0 0 0 0 0/1
EMBEDDED BIT
x x x x x x x 0/1
OBTAINED PIXEL DATA

FIG. 8

R PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. , 1ST C.P.
2ND BIT	2ND C.P. , 1ST C.P.
⋮	⋮
44TH BIT	2ND C.P. , 7TH C.P.

FIG. 9

G PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. + 5 , 1ST C.P. + 5
2ND BIT	2ND C.P. + 5 , 1ST C.P. + 5
⋮	⋮
44TH BIT	2ND C..P. + 5 , 7TH C.P. + 5

FIG. 10

B PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. − 5 , 1ST C.P. − 5
2ND BIT	2ND C.P. − 5 , 1ST C.P. − 5
⋮	⋮
44TH BIT	2ND C..P. − 5 , 7TH C.P. − 5

FIG. 11

R PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. , 1ST C.P.
2ND BIT	2ND C.P. , 1ST C.P.
⋮	⋮
47TH BIT	5TH C.P. , 7TH C.P.
48TH BIT	6TH C.P. , 7TH C.P.
49TH BIT	7TH C.P. , 7TH C.P.

FIG. 12

G PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. + 5 , 1ST C.P. + 5
2ND BIT	2ND C.P. + 5 , 1ST C.P. + 5
⋮	⋮
47TH BIT	5TH C.P. + 5 , 7TH C.P. + 5
48TH BIT	6TH C.P. + 5 , 7TH C.P. + 5
49TH BIT	7TH C.P. + 5 , 7TH C.P. + 5

FIG. 13

B PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. − 5 , 1ST C.P. − 5
2ND BIT	2ND C.P. − 5 , 1ST C.P. − 5
⋮	⋮
47TH BIT	5TH C.P. − 5 , 7TH C.P. − 5
48TH BIT	6TH C.P. − 5 , 7TH C.P. − 5
49TH BIT	7TH C.P. − 5 , 7TH C.P . − 5

FIG. 14

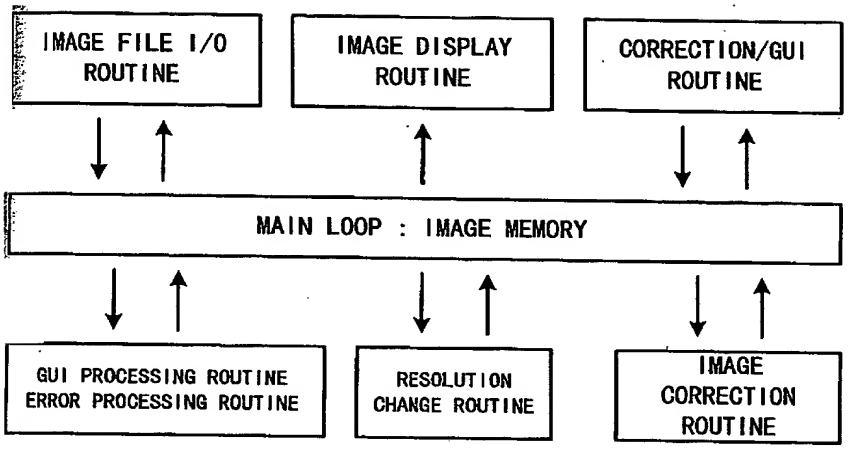


IMAGE FILE I/O ROUTINE
IMAGE DISPLAY ROUTINE
CORRECTION/GUI ROUTINE
MAIN LOOP : IMAGE MEMORY
GUI PROCESSING ROUTINE
ERROR PROCESSING ROUTINE
RESOLUTION CHANGE ROUTINE
IMAGE CORRECTION ROUTINE

FIG. 15

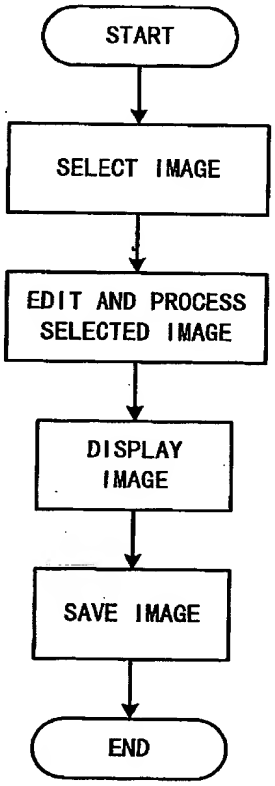
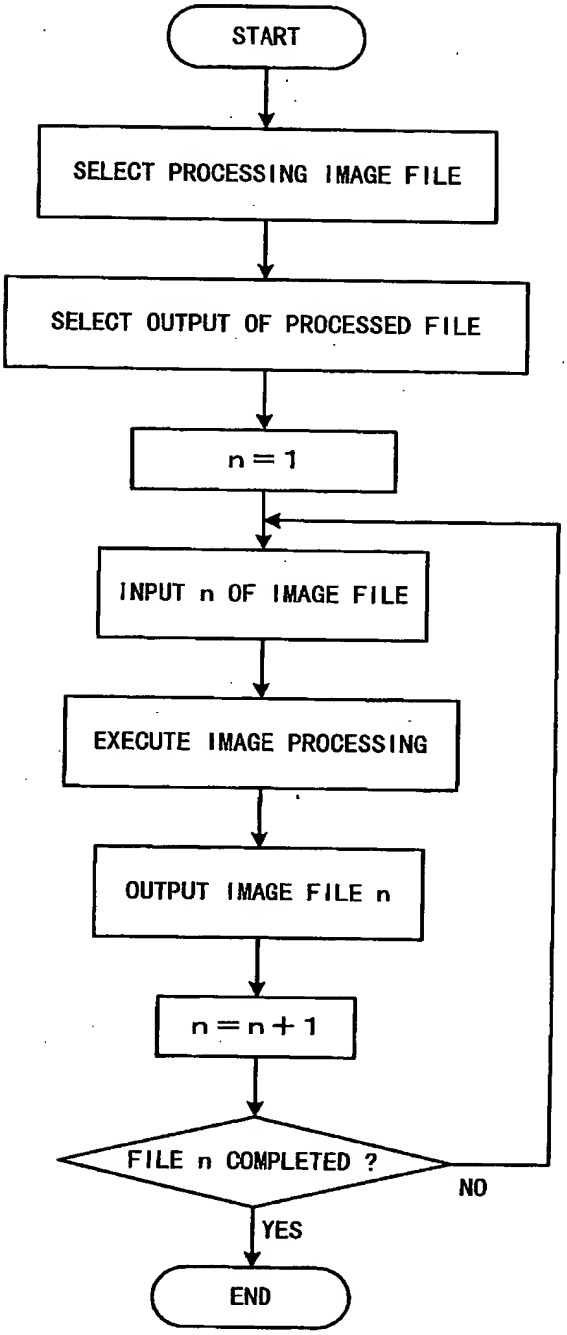

START
SELECT IMAGE
EDIT AND PROCESS SELECTED IMAGE
DISPLAY IMAGE
SAVE IMAGE
END

FIG. 16


START
SELECT PROCESSING IMAGE FILE
SELECT OUTPUT OF PROCESSED FILE
n = 1
INPUT n OF IMAGE FILE
EXECUTE IMAGE PROCESSING
OUTPUT IMAGE FILE n
n = n + 1
FILE n COMPLETED ?
NO
YES
END

[Document's Name] ABSTRACT OF THE DISCLOSURE

[Abstract]

[Problem] When image processing is performed on original image data, it can be determined from processed image data what processing was executed on the image data.

[Solution] Specific information such as the type of performed image processing, and date is disassembled to bits, and the resulting bits are placed, e.g., in the least significant bit positions of pixels within processed image data.

[Selected Drawing] Fig. 2

[Document's Name] Amended Data

[Amended Document] Application for Patent

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